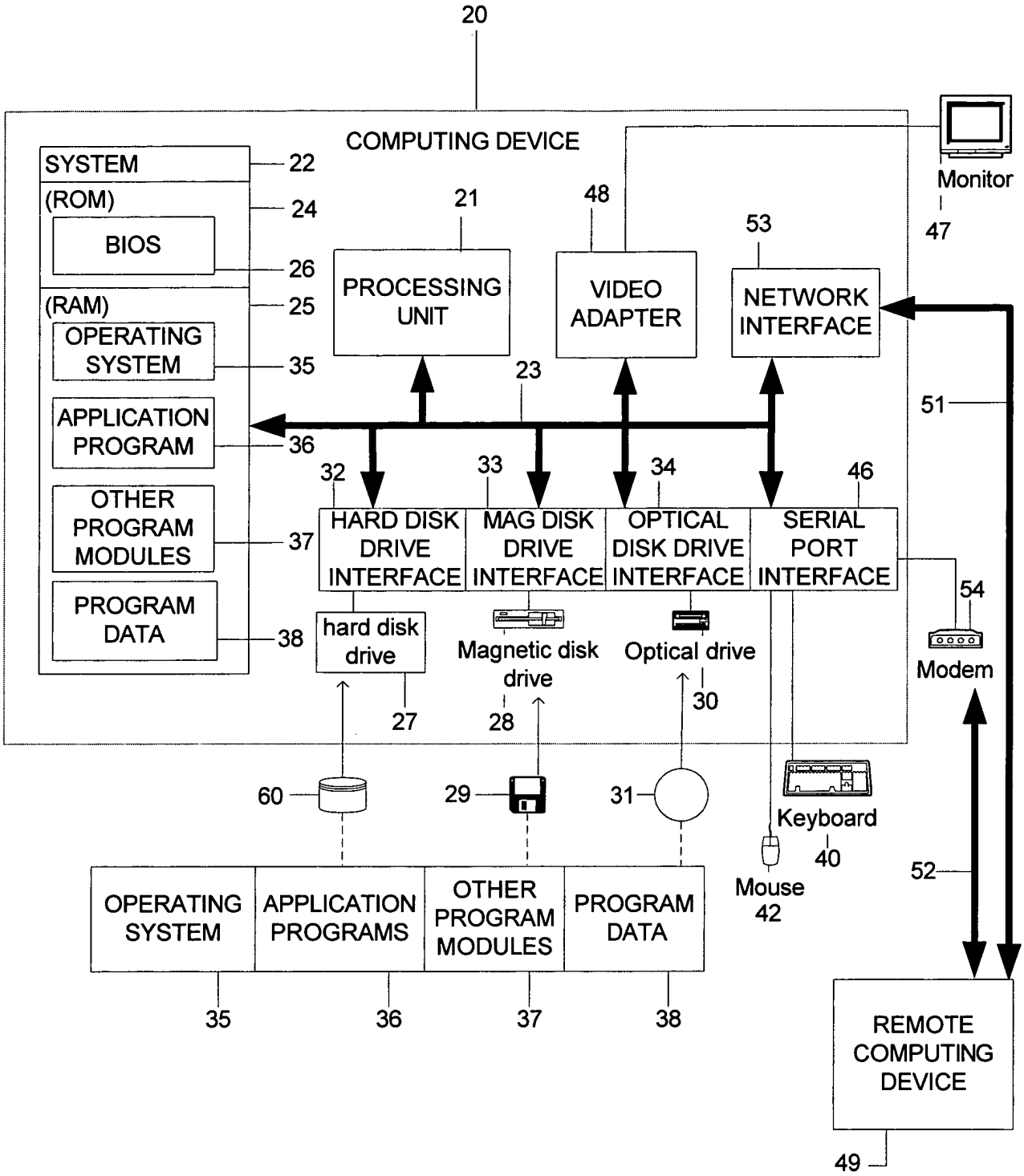
20
COMPUTING DEVICE
SYSTEM
22
(ROM)
24
BIOS
26
(RAM)
25
OPERATING SYSTEM
35
APPLICATION PROGRAM
36
OTHER PROGRAM MODULES
37
PROGRAM DATA
38
21
PROCESSING UNIT
48
VIDEO ADAPTER
53
NETWORK INTERFACE
Monitor
47
23
51
32
33
34
46
HARD DISK DRIVE INTERFACE
MAG DISK DRIVE INTERFACE
OPTICAL DISK DRIVE INTERFACE
SERIAL PORT INTERFACE
54
hard disk drive
Magnetic disk drive
Optical drive
Modem
27
28
30
60
29
31
Keyboard
40
Mouse
42
52
OPERATING SYSTEM
APPLICATION PROGRAMS
OTHER PROGRAM MODULES
PROGRAM DATA
35
36
37
38
REMOTE COMPUTING DEVICE
49

FIGURE 1

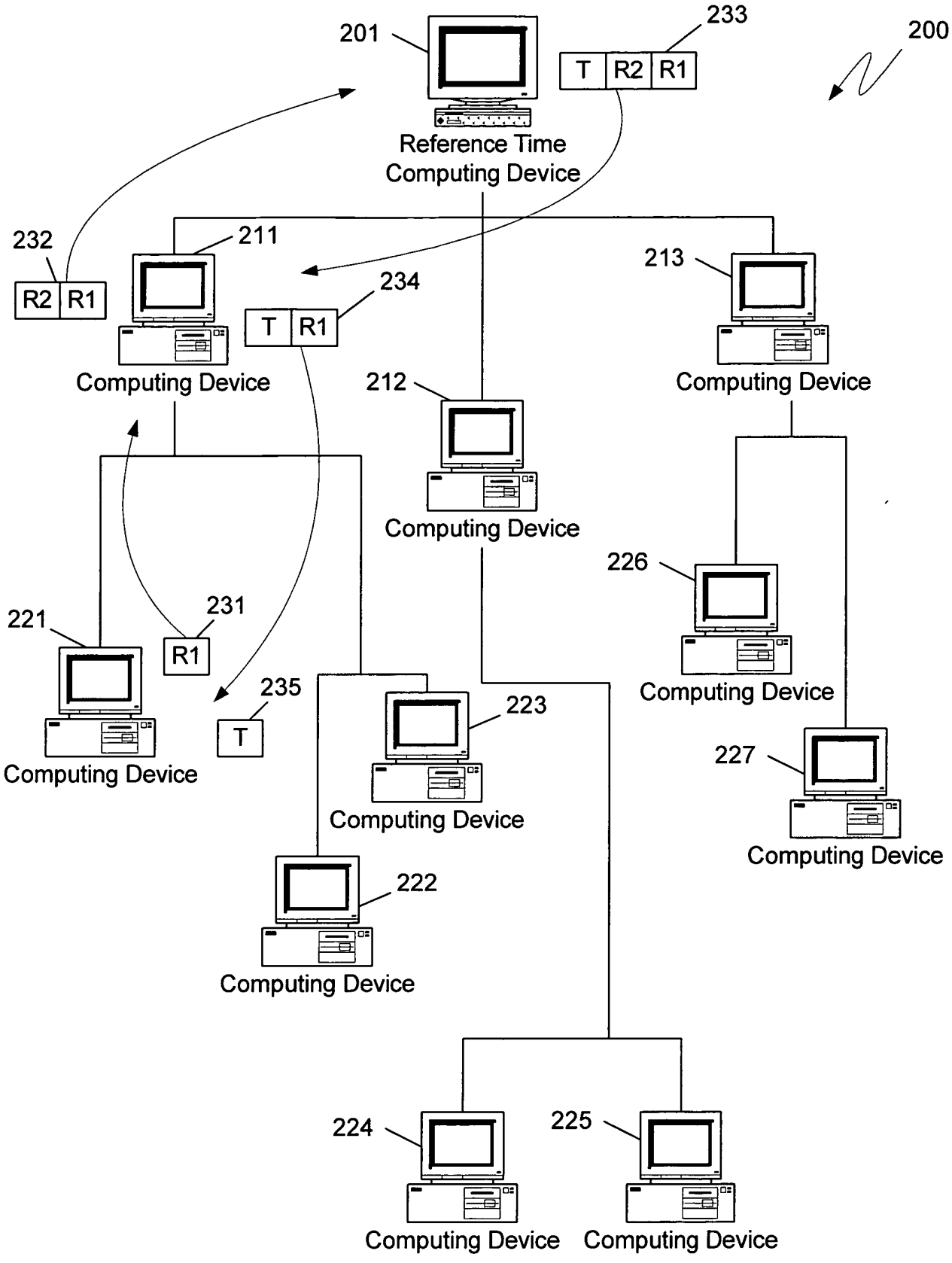
201
233
T
R2
R1
200
Reference Time
Computing Device
232
R2
R1
211
234
T
R1
213
Computing Device
Computing Device
212
Computing Device
226
Computing Device
221
231
R1
235
T
223
Computing Device
227
Computing Device
Computing Device
222
Computing Device
224
225
Computing Device
Computing Device

FIGURE 2

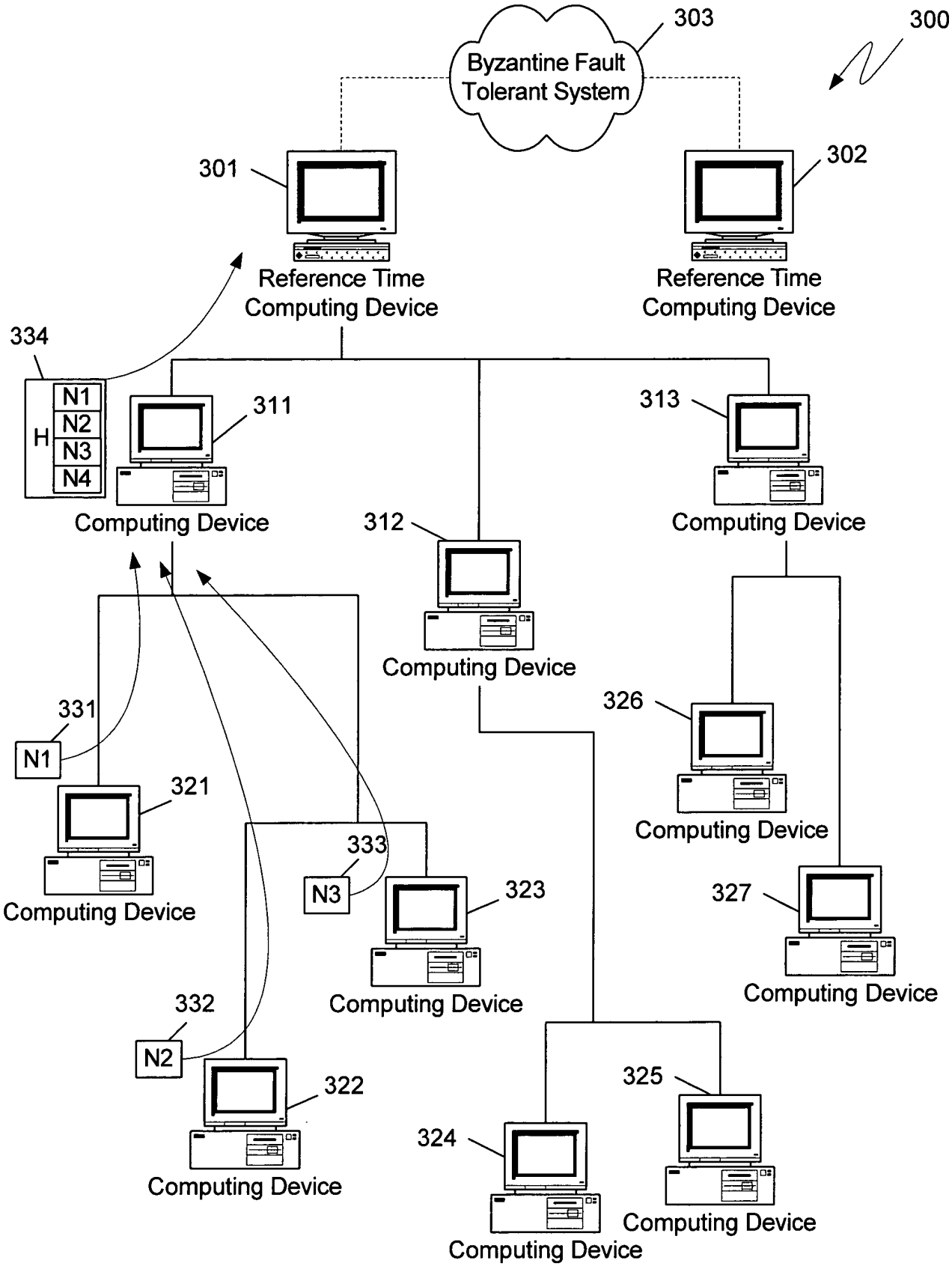
303
300
Byzantine Fault Tolerant System
301
302
Reference Time Computing Device
Reference Time Computing Device
334
H
N1
N2
N3
N4
311
313
Computing Device
Computing Device
312
Computing Device
331
N1
321
326
Computing Device
Computing Device
333
N3
323
327
Computing Device
Computing Device
332
N2
322
325
324
Computing Device
Computing Device
Computing Device

FIGURE 3a

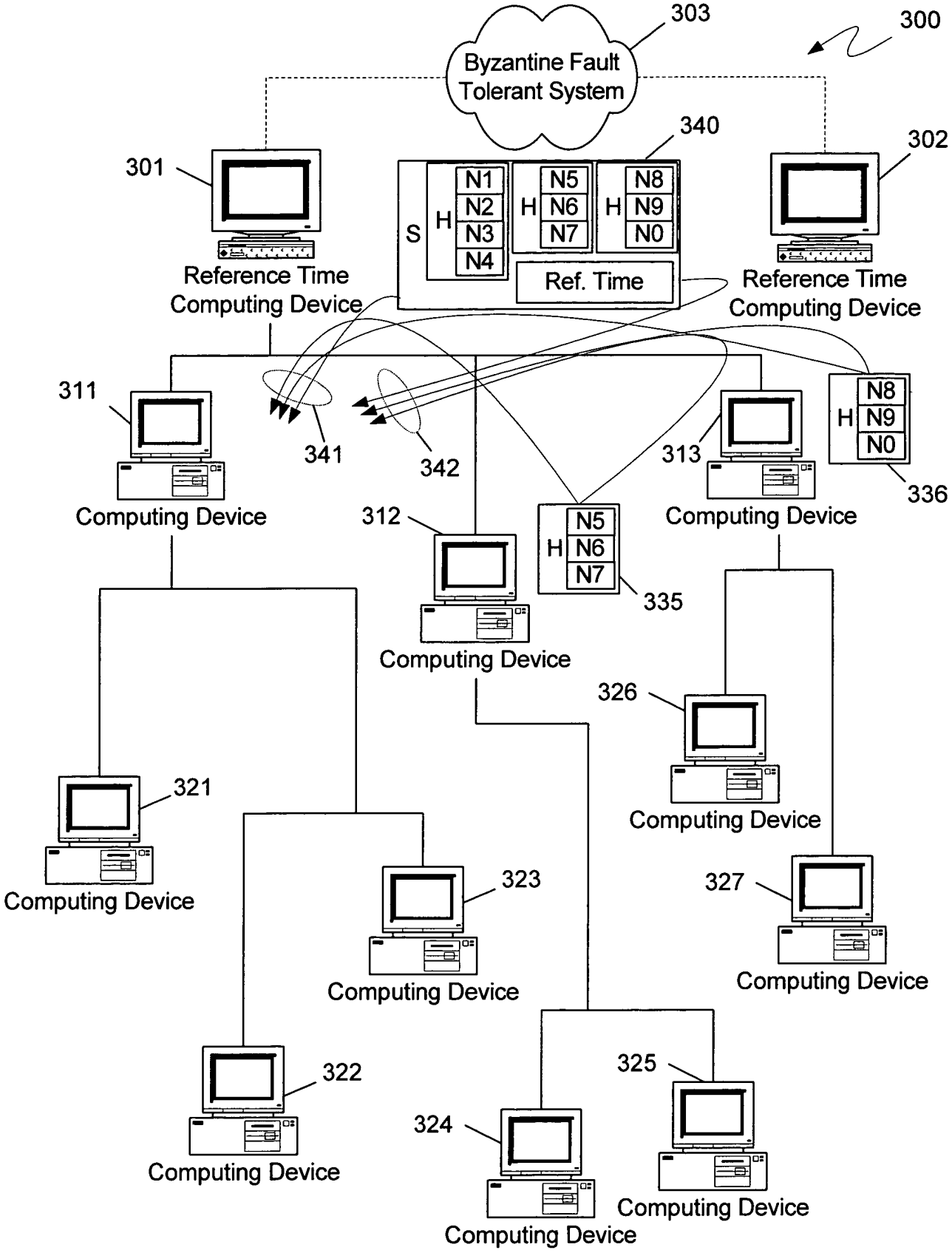
303
300
Byzantine Fault Tolerant System
340
301
302
S
H
N1
N2
N3
N4
H
N5
N6
N7
H
N8
N9
N0
Ref. Time
Reference Time Computing Device
Reference Time Computing Device
311
341
342
313
H
N8
N9
N0
336
Computing Device
312
H
N5
N6
N7
335
Computing Device
Computing Device
326
321
Computing Device
Computing Device
323
327
Computing Device
Computing Device
322
325
324
Computing Device
Computing Device
Computing Device

FIGURE 3b

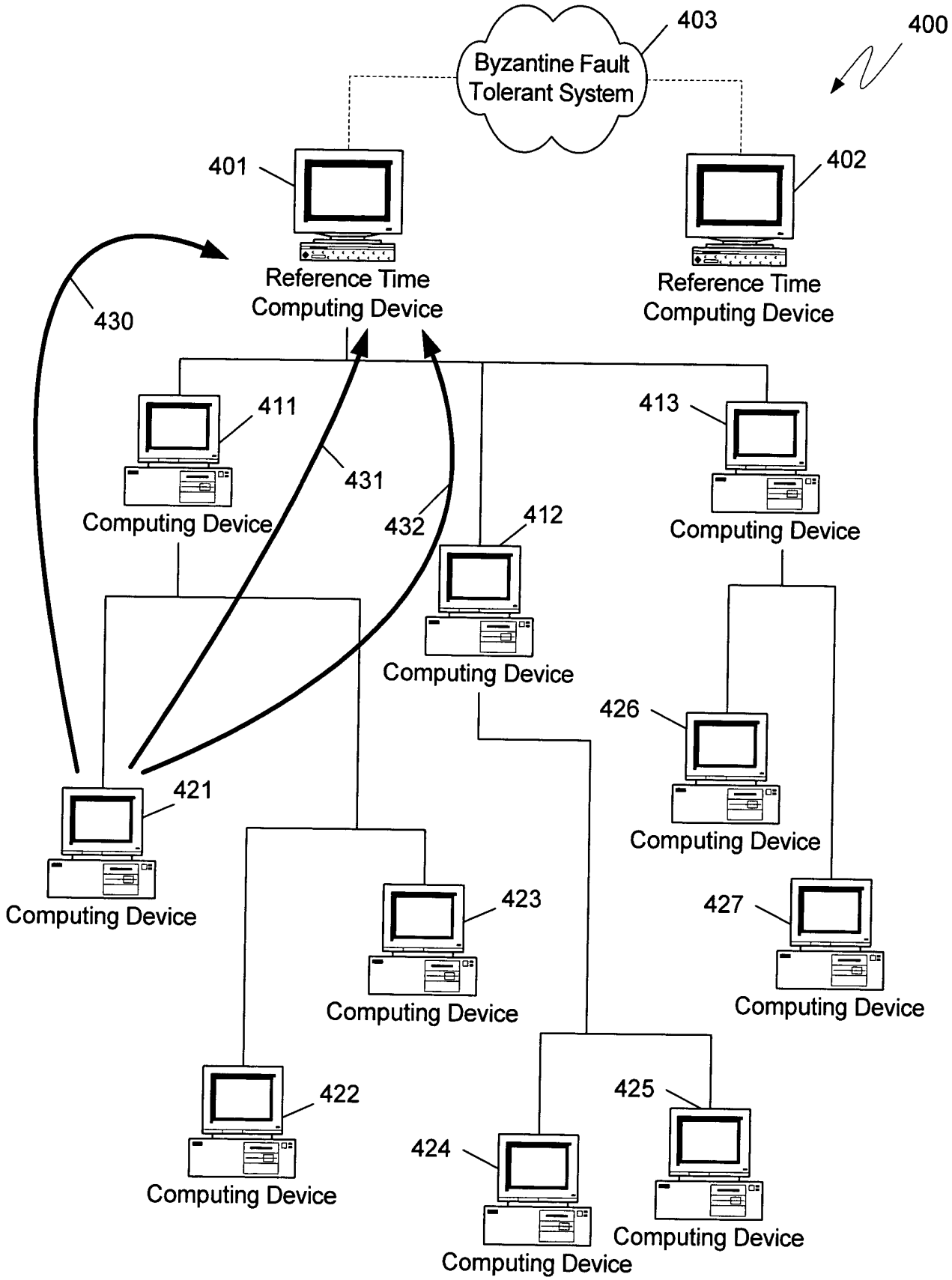
403
400
Byzantine Fault Tolerant System
401
402
Reference Time Computing Device
Reference Time Computing Device
430
411
431
413
Computing Device
432
412
Computing Device
Computing Device
426
421
Computing Device
423
427
Computing Device
Computing Device
422
425
424
Computing Device
Computing Device
Computing Device

FIGURE 4

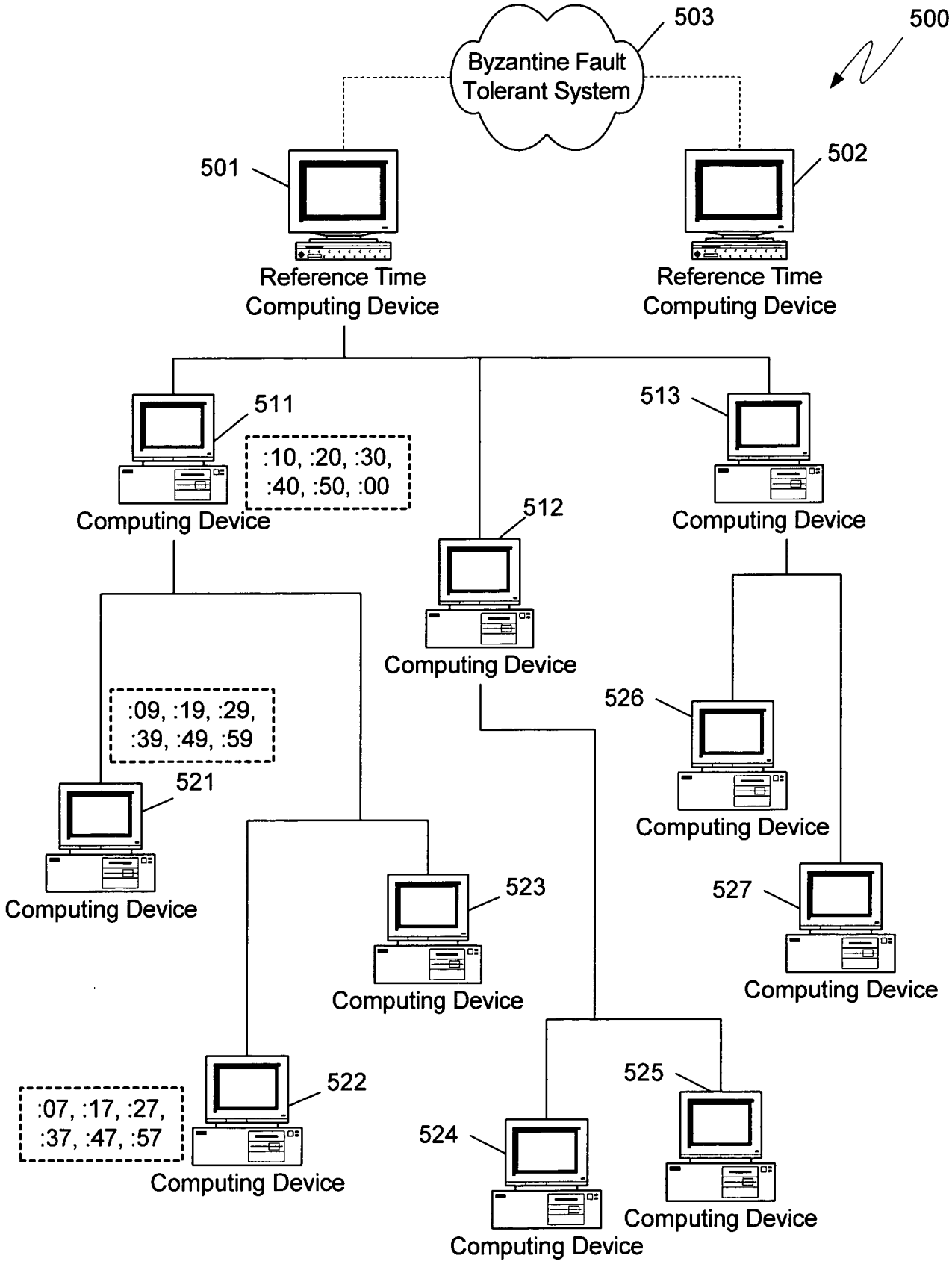
503
500
Byzantine Fault Tolerant System
501
502
Reference Time Computing Device
Reference Time Computing Device
511
:10, :20, :30, :40, :50, :00
Computing Device
513
Computing Device
512
Computing Device
526
:09, :19, :29, :39, :49, :59
521
Computing Device
Computing Device
523
527
Computing Device
Computing Device
522
:07, :17, :27, :37, :47, :57
Computing Device
524
525
Computing Device
Computing Device

FIGURE 5